Revolutionary Advances in Gene Splicing are a Sign of the End Time

by Jeremy James

Several times in the Word of God we are told that man is made in the image and likeness of God:

> **"And God said, Let us make man in our image** [*tselem*]**, after our likeness** [*dĕmuwth*]**: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth. So God created man in his own image** [*tselem*]**, in the image** [*tselem*] **of God created he him; male and female created he them." (Genesis 1:26-27)**
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> **"This is the book of the generations of Adam. In the day that God created man, in the likeness** [*dĕmuwth*] **of God made he him; Male and female created he them; and blessed them, and called their name Adam, in the day when they were created. And Adam lived an hundred and thirty years, and begat a son in his own likeness** [*dĕmuwth*]**, after his image** [*tselem*]**; and called his name Seth:" (Genesis 5:1-3)**
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> **"Whoso sheddeth man's blood, by man shall his blood be shed: for in the image [*tselem*] of God made he man." (Genesis 9:6)**

The actual construction of man in the womb is described in Psalm 139. From many passages in Scripture we know that man is seen by God as a living individual from the moment of conception (See our paper, *The Curse of Abortion in Ireland*, for an examination of these passages).

This means that as soon as the male and female gametes combine – when the sperm fertilizes the ovum – a being has come into existence in the image and likeness of God. The entire structure of this being, including the composition of each individual cell, has been determined in its totality by our Creator.

Since the very start of mankind, when God created Adam from the dust of the ground, this remarkable process has been repeated many billions of times, and in every case the human being so formed had the image and likeness of God. This was true whether the child was conceived through *in vitro* fertilization or proved to have serious, even life-threatening, genetic abnormalities.

The Question

The question we wish to address in this paper would have seemed absurd even fifty years ago, but advances in technology have made it central to our understanding of Bible prophecy. The question is this: To what extent can the human genome be modified before the individual is no longer in the image and likeness of God?

To understand the ramifications of this question, we need to appreciate the type and extent of the modifications that modern scientific techniques can now make to the human genome. In effect we are asking, To what extent can the human genome be re-engineered before it ceases to be human?

Even though we cannot answer this question, we must weigh its implications very carefully since we know in principle that, if too many changes are made to the human genome, then it must eventually cease to be human. It may be human-*like* in all respects, as science may determine, but not truly human in God's eyes. This would mean it was no longer made or constituted in the image and likeness of God.

We know that Satan wants to destroy God's work. Until recently most Bible scholars have assumed – quite reasonably – that he intends to do this primarily through disease, famine, and war. But genetic engineering now offers yet another way to 'destroy' mankind, namely to re-engineer the human genome so that the offspring produced from it are no longer human in a Biblical sense.

This may explain why salvation is impossible for anyone who accepts the mark of the beast (Revelation 13:16). There is no doubt that, by taking the mark, they have passed the point of no return:

> **"And the smoke of their torment ascendeth up for ever and ever: and they have no rest day nor night, who worship the beast and his image, and whosoever receiveth the mark of his name." (Revelation 14:11)**

It is not inconceivable that the mark will entail a genetic modification which is so far-reaching in its effects that those who accept it are no longer truly human.

The Technology

Now let's look at the technology and see just how powerful it has become.

The structure of DNA was first identified in 1953 but it was not possible at that time to change it in any predetermined way. At best, scientists could bombard it with radiation and cause random damage to its chromosomes. Working with plant cells for example, they could cultivate the irradiated varieties and see which, if any, expressed a useful mutation. Red grapefruit was produced in this way, plus certain varieties of barley.

In such cases, no information was added to the genome. If an interesting change came about it was due entirely to a loss of information, where a specific gene got damaged and could no longer function normally. This in turn might affect the height of the plant at maturity, for example, or the color of its flowers, but unless some new information is added to the genome, no real modification is achieved.

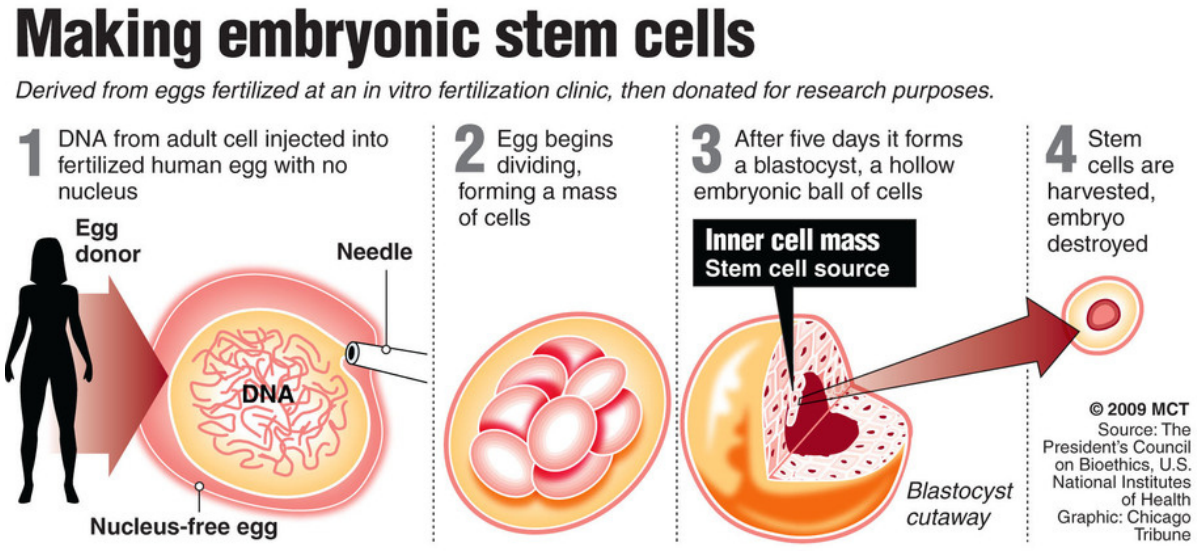
DNA consists of two long, intertwining strings of genetic information, the so-called double helix. The information is encoded in an unbroken sequence of just four biological components known as nitrogen bases – adenine, guanine, cytosine, and thymine (usually designated by their initials - A, G, C and T). These are the 'letters' in which all genetic information is encoded.

Fragment of DNA showing the fixed sequence of the four nitrogen bases.

Big Step #1 – restriction enzymes
The first big step in genetic engineering came in the 1970s when scientists discovered that proteins called restriction enzymes could cut a sequence of DNA out of a genome. These enzymes were extracted from certain types of bacteria and aimed at a specific sequence of DNA in, say, the genome of a mouse. This made a fundamental alteration in the genome that would not otherwise occur in nature. The offspring of the mouse could then be monitored over several generations to see what impact the alteration had on their metabolism, behavior, immune system, etc. A great deal of trial and error over many months, even years, might be needed to produce even one outcome of value for research purposes.

Big Step #2 – PCR
The second big step came in 1983 with the discovery of a remarkably effective technique for replicating strands of DNA. Known as a polymerase chain reaction (PCR), it generated thousands of copies of the sequence of DNA that was being used for research purposes. It is this technique that allows forensic laboratories to generate enough DNA from a tiny fragment found at a crime scene to facilitate chemical analysis. It was also a great boon for geneticists since it allowed several members of a research team to work simultaneously on the same strand of DNA and to share their findings.

Big Step #3 – stem cell research
Human embryonic stem cells were first extracted and kept viable by researchers in Wisconsin in 1998. In a developing embryo, stem cells are able to differentiate into specialized cells of various kinds. This is how a child's body or embryo develops in the womb, with stem cells dividing and specializing at each step in the developmental process to produce each of the internal organs, along with blood vessels, nerve tissue, bone marrow, and so forth. This explains why the blood contained in the umbilical cord after birth is extremely rich in stem cells. The ability to induce such cells to differentiate or specialize in a particular way under laboratory conditions is fast becoming an immensely powerful research tool.



Adult stem cells differentiate to regenerate only the organ or tissue in which they are located. Harvested from bone marrow, another rich source of stem cells, they have been used in the treatment of a number of chronic health conditions, including leukemia and cirrhosis of the liver.

Human stem cell research has given rise to much controversy since it enables the creation of chimeras, namely organisms comprising both human and animal cells. For this reason many countries have banned the production of embryonic stem cell lines.

Big Step #4 – mapping the human genome

The next big step came with the Human Genome Project which was completed and published in 2003. This mapped the entire DNA – the fixed sequence of nitrogen bases (CGAT) – in the human genome and enabled scientists to adopt a much more strategic approach to their research. For example, they could now make better use of the findings published by other scientists working on the same part of the genome.

Big Step #5 – CRISPR

CRISPR was akin to step #1 in that it involved the discovery of an enzyme that could cut out strands of DNA – but in this instance with staggering precision. It was also akin to step #2 in that it offered a cheap, effective and highly efficient way of doing something that would otherwise consume huge quantities of research time and resources. On top of this it greatly amplified the advantages gained from steps #3 and #4 by enabling scientists to target any part of the human genome and share their findings with a worldwide audience.

CRISPR also did something so remarkable that scientists could hardly believe it at first. In addition to cutting a selected strand of DNA with great precision, it could also insert a selected replacement strand into the gap. In effect, it worked as a cut and paste tool for editing or 'reengineering' the genome of any organism.

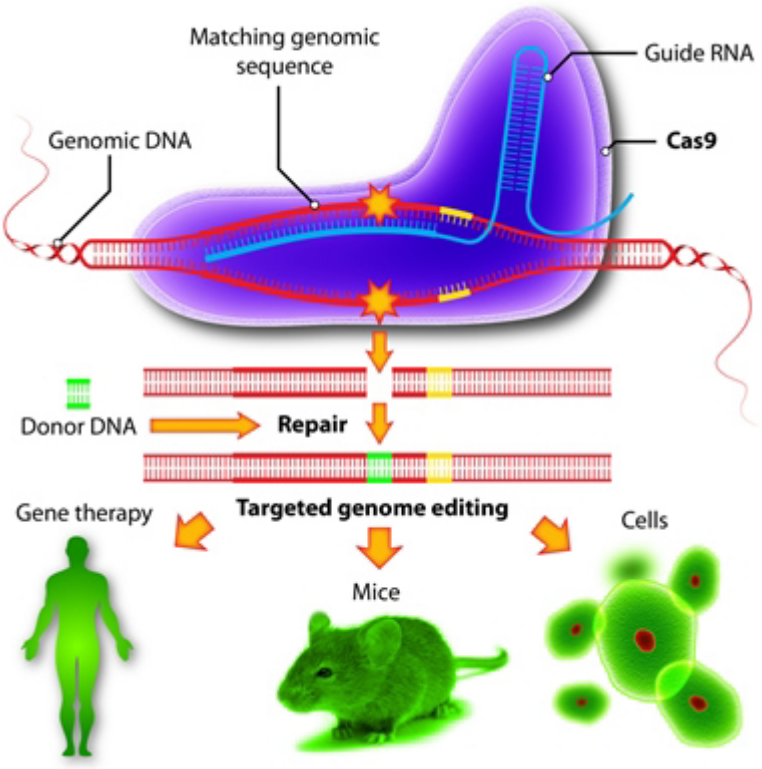
For example, if a scientist wanted to get a better understanding of the function performed by each of the sequences in the fragment of DNA shown below, he could literally move them around using CRISPR and insert the modified sequence into the reproductive cells of a mouse. If the alterations were viable, the resulting offspring would be a living expression of the modified genome.

How CRISPR emerged

CRISPR was preceded by two other gene-editing tools, both of which were slow, cumbersome and expensive to use. The first was discovered in 2002, a category of enzyme known as a zinc-finger nuclease which could delete and replace specific genes. This was followed closely by another restriction enzyme technique called a TALEN. In addition to their cost and complexity, both techniques required an extensive familiarity with the genome of the organism under study. This meant, in practice, that useful findings from these techniques came mainly from research on traditional subjects, such as mice, fruit flies, zebrafish, and a nematode called *C elegans*.

A notable step in the development of CRISPR was taken around 2005 when research staff at a yogurt producer in Wisconsin were trying to find culture bacteria that were more resistant to viruses. Entire cultures of the bacteria that were needed to convert milk into yogurt could be lost if attacked by a new strain of bacteria-eating virus. So they devised a simple experiment where they infected a major variety of milk-fermenting bacteria with two strains of killer virus. The viruses killed most of the bacteria, but a few survived. Since all of the bacteria had the same DNA sequence at the outset, and since their descendants were also resistant, the survivors must have successfully altered their DNA in some manner.

When the research staff examined the genetic structure of the resistant strain they discovered that it had incorporated fragments of DNA from the killer virus in its own DNA. They conducted further experiments and found that when these fragments of viral DNA were removed from the bacterial DNA, the bacteria lost their resistance.



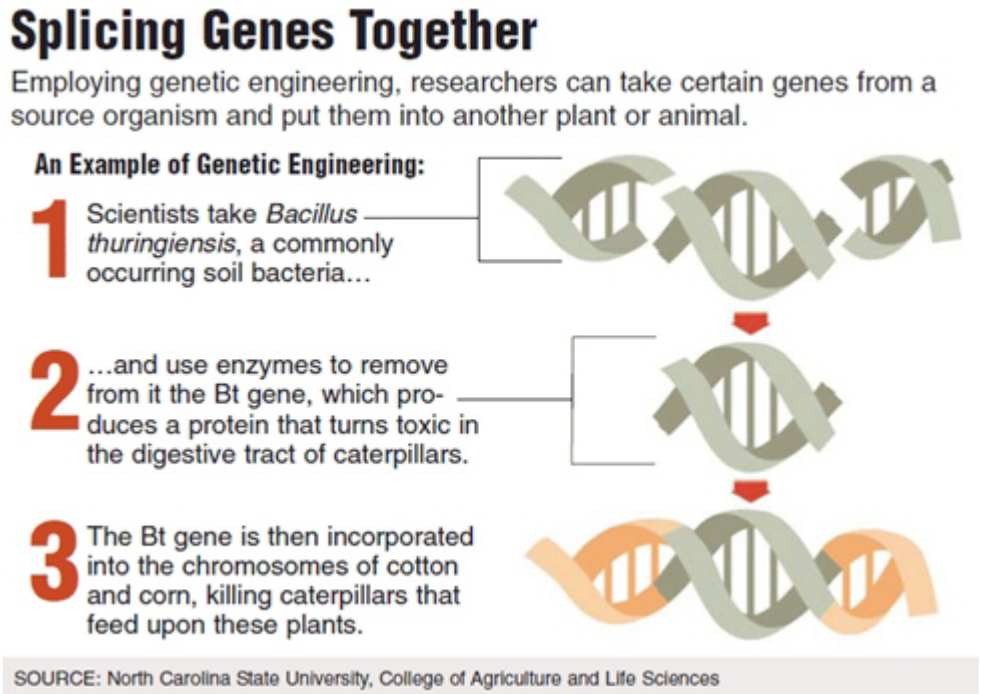
An amazing, naturally occurring microbiological process

The research staff had not invented anything new. Rather they had stumbled upon an amazing microbiological process, the full implications of which would not be recognized until 2012 or thereabouts when other research teams chanced upon it. The bacteria, like most living organisms, had an immune system. When the killer viruses attacked, a few of the bacteria managed to sever part of the viral DNA and incorporate it into their own DNA. As a result every individual bacterium in a culture grown exclusively from these survivors would now possess a 'picture' or mug-shot of the enemy. This would enable them in future to recognize and neutralize a killer virus before it had time to destroy the culture.

The word CRISPR is an acronym from the descriptive term, "clustered regularly interspaced short palindromic repeats." This refers to the DNA fragment that the yogurt bacteria clipped from the invading virus and added to its own DNA. The fragments are generally found in clusters, are regularly spaced, are not very long, and read the same forwards and backwards (just like a palindrome).

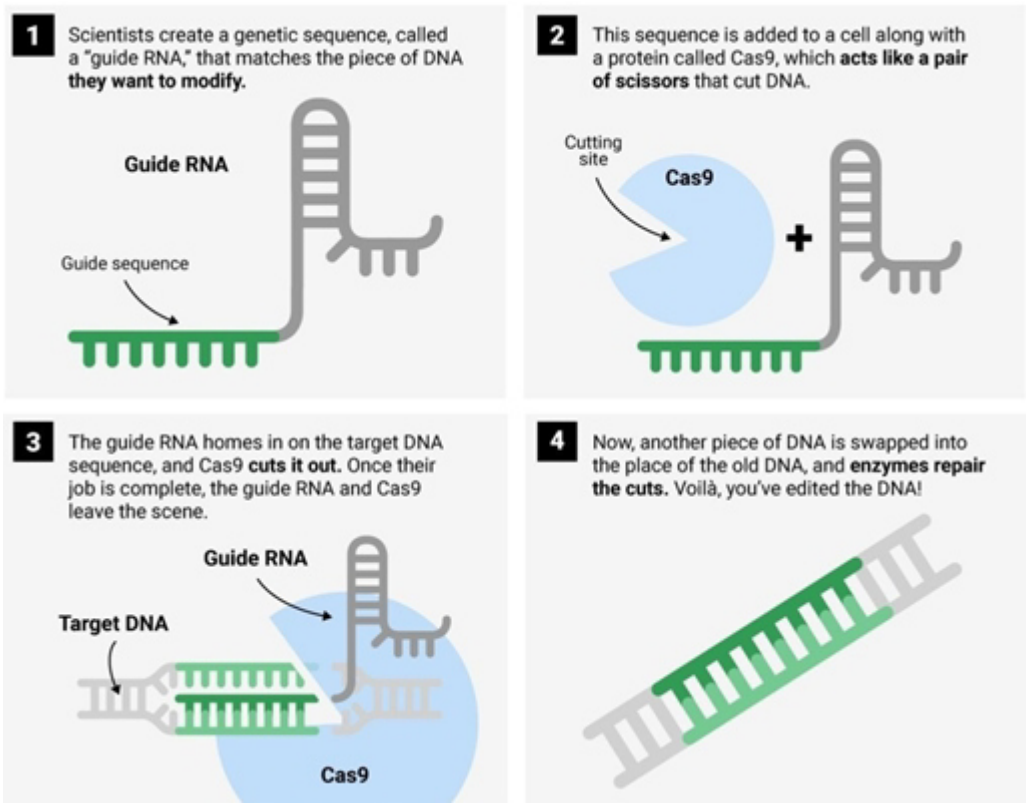
Multi-celled organisms cannot pass on genetic information to their offspring in this way because the cells associated with reproduction are not affected by adaptations to their immune system. However, a single-celled organism can pass it along since the DNA that fights viruses is the same DNA that is passed on in cell-division, the method of replication in a single-celled organism.

Further research has shown that the DNA sequence includes, next to the 'mug shot' gallery, a set of genes that encode for virus-cutting enzymes. The moment they come across a virus matching a mug shot, they slice through its DNA.



The cutting ability of certain enzymes was the basis for Big Step #1. However, a research team at the University of California, Berkeley, realized that, if the cutting function in a CRISPR enzyme was guided by the fragment encoded in the mug shot, then it was in principle programmable. If one replaced the mug shot DNA with a different fragment of DNA – any fragment from any source – then the CRISPR mechanism would search until it found a match and cut it out.

Using this technique, fragments of DNA can be clipped from one species and added to the DNA of another, whether the source or target is a plant, fish, mammal, reptile, bird, insect, fungus, bacterium or virus.



Editing a gene using the CRISPR/Cas9 technique.
Note: RNA is a single strand of genetic information that implements instructions from the DNA.

Results obtained from CRISPR

In just a few years, CRISPR has been used to reverse mutations that cause blindness, stop certain cancers from multiplying, make cells impervious to the AIDS virus, render wheat immune to the fungus known as powdery mildew, slow the rate at which tomatoes ripen, alter the DNA of yeast to produce ethanol from plant matter, and correct the genetic defects that cause sickle-cell anemia, muscular dystrophy, beta-thalassemia, haemophilia, and cystic fibrosis. With equipment costing just a few thousand dollars, CRISPR enables a competent college graduate to obtain results that would formerly have needed a team of the most qualified and most experienced scientists, and to do so in only a fraction of the time.

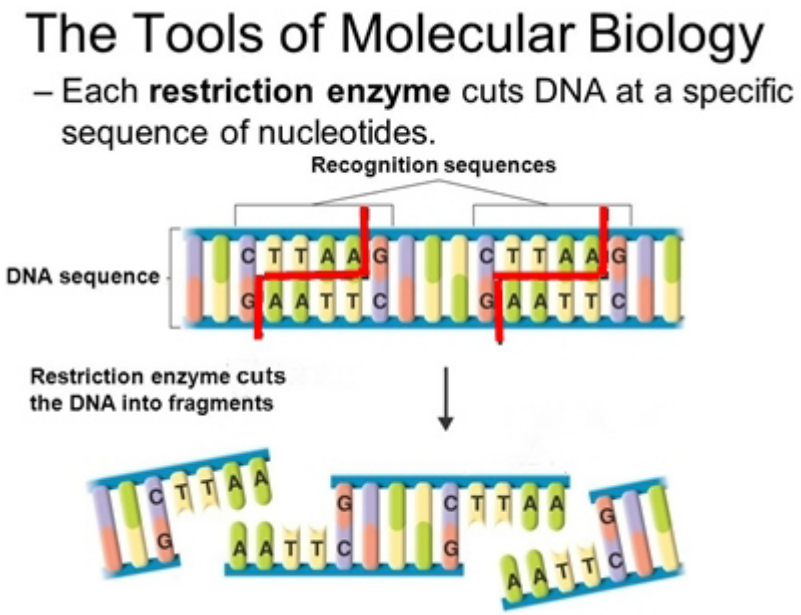
A non-profit company called Addgene was established more than a decade ago to store and distribute tens of thousands of ready-made genetic sequences, including nearly every RNA guide used to edit genes with CRISPR. Every time a lab makes a useful discovery it donates a copy to Addgene and thereby makes it available for use by the worldwide community of geneticists.

CRISPR and genetically modified mice

Certain mammals, such as mice, rats and pigs, are susceptible to complex diseases that affect the brain and immune system. They get cancer, atherosclerosis, hypertension, diabetes, and other chronic illnesses. This makes them unusually good subjects for the study of related diseases in humans. Mice are especially useful since they reproduce every three weeks, allowing researchers to study several generations at the same time.

When scientists originally began editing DNA with CRISPR, they had to inject both the relevant enzyme – researchers most often use the Cas9 cutting enzyme from the common throat bacterium, *Streptococcus pyogenes* – and the RNA probe required to guide it. A lab at MIT greatly reduced the work involved by implanting the enzyme into the embryo of a mouse and making it part of its permanent genome. Every time a cell divided, the relevant enzyme would be carried forward. Since the enzyme for cutting DNA was now present in every cell, scientists had only to add the RNA guide. In fact several guides could be inserted at once to produce multiple mutations in the genes they wished to study.

This easy-to-edit mouse is just one example of the way genetic research has accelerated. The mouse would formerly have taken ten years or more for a dedicated team of scientists to develop; it now took one person just four months. Thus CRISPR is even speeding up the process by which new tools are being developed.



CRISPR and cancer research

The genetic structure of the cancer infecting an individual is unique to that person. Even in the same type of cancer, no two cases are genetically identical. This makes treatment difficult. However, the huge fall in the cost of sequencing a genome – mapping its genetic code – could make it possible to develop a treatment specific to each individual. A suitable CRISPR enzyme and tailored RNA guide could be designed and injected into the tumor that would cut apart its DNA.

CRISPR and transgenic pigs

Scientists have long believed that humans might accept organ transplants from pigs because of certain common biochemical characteristics. However pig DNA has a large number of retroviruses that are harmful to humans. One leading researcher identified a genetic sequence common to these viruses and used CRISPR to cut them out – 62 in all. He was then able to mix pig cells with human cells without infecting the latter.

Genetically modified rhesus macaque. The DNA fragment that enables certain jellyfish to fluoresce was spliced into the rhesus genome in 2002, causing it to glow under ultraviolet light. Please note that this was achieved before CRISPR was discovered.

CRISPR and gene drives

Almost all genetic changes in nature are spread throughout a population by sexual reproduction, where half of the genes in the genome of each immediate descendant come from the father and half from the mother. This means that there is always a 50-50 chance that a genetic change would not be passed on to the next generation. However scientists have found certain rare, naturally occurring, genes that manage to get themselves passed on with a much higher success rate. Because of their ability to propel themselves forward from one generation to the next, they are known as gene drives. These are being used alongside CRISPR to ensure that CRISPR-generated mutations are passed rapidly through a target population. Before long every member has the modified gene, even if the population is widely dispersed – such as a species of mosquito or a tropical tree frog.

Human germ-line modification

In 2015, the widely respected scientific journals, *Nature* and *Science*, refused to publish the results of an experiment in China in which non-viable human embryos were genetically modified using CRISPR to edit the gene that encodes the β-globin protein. Mutations in this gene cause the body to produce an abnormal form of hemoglobin, a condition known as β-thalassemia. The editors were concerned that experiments of this kind could change the human genome (or germ line). While it was seemingly not possible in the Chinese experiment, it is widely believed that even tightly controlled research could lead – perhaps in a short span of time – to experiments that inadvertently altered the germ line.

In a related development in 2016, the UK government approved a clinical trial to inhibit the transmission of mitochondrial diseases in humans. The DNA in our mitochondria – the energy-producing organelle in our cells – comes only from our mother and is completely separate from the DNA that encodes for every other function in our body. The trial was approved on the grounds that mitochrondrial DNA is located outside the nucleus of the cell, where our 'principal' DNA is stored. Thus scientists are convinced that changes made to mitochondrial DNA – which <u>will</u> be passed on to future generations – would not affect our nuclear DNA. The two germ lines, they allege, would remain completely independent.

Genetically modified micro-pig.

Growth hormone genes in a small breed of pig were modified by Chinese scientists to make it even smaller. This too was achieved <u>without</u> CRISPR.

These micro-pigs will not exceed 60 lbs at maturity, unlike 'teacup' pigs, which can grow to 100 lbs or more.

Scientists with ethical concerns

The scientific community has long been concerned that genetic engineering could lead in time to catastrophic results. A group of leading geneticists held a convention at Asilomar, California in 1975 to assess the risks and agree a research protocol to ensure that a disaster could never occur. It is chastening to think that these men and women were sounding the alarm at a time when gene-editing technology was still very primitive by today's standards.

For some reason, not many scientists today are expressing similar concerns. With a few notable exceptions, such as Professor Jennifer Doudna, who helped develop the CRISPR system, they don't seem to appreciate the risks posed by this highly advanced technology. Doudna was a principal author of a letter published in *Science* (March 20, 2015) which called for a temporary moratorium on gene-editing research. Along with several others, she also organized an international conference on safety and ethics in the field of genetics at the National Academy of Sciences in Washington DC.

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In a revealing interview with the *New Yorker* magazine (November 16, 2015) she cited an anecdote that encapsulates the concerns of many scientists:

> I have never said this in public, but it will show you where my psyche is. I had a dream recently, and in my dream [a leading scientific researcher] had come to see me and said, 'I have somebody very powerful with me who I want you to meet, and I want you to explain to him how this technology functions.' So I said, 'Sure, who is it?'
>
> It was Adolf Hitler. I was really horrified, but I went into a room and there was Hitler. He had a pig face and I could only see him from behind and he was taking notes and he said, 'I want to understand the uses and implications of this amazing technology.' I woke up in a cold sweat. And that dream has haunted me from that day.

On the other hand, some leading geneticists argue that the risks are exaggerated and that an undesirable outcome can always be reversed. One is quoted as saying, "In my lab, we make mutations all the time and then we change them back."

A transgenic animal is one that carries a foreign gene that has been deliberately inserted into its genome. Genes that regulate growth were taken from the ocean pout and chinook salmon and inserted into the genome of the Atlantic salmon, causing it to grow more quickly and to attain a greater size at maturity. One year after the eggs hatch, salmon that have been genetically modified reach an average of 1,340g, compared to 663g for the ordinary Atlantic salmon. The FDA approved the GM version for human consumption in 2015.

Biohacking

The new technology is so simple – relatively speaking – that even self-taught amateurs are attempting to construct gene-editing experiments. It is also relatively inexpensive compared to other branches of scientific research. An interested party with a graduate-level knowledge of biology could buy much of the equipment needed for a few thousand dollars. Companies like Addgene would supply the necessary RNA guides, enzymes, and ancillary chemicals for a few hundred dollars. Even if his early trials were not successful, the cost of conducting repeat trials would be nominal, while Internet archives would provide access to relevant scientific papers.

Such people, sometimes called biohackers, already exist! Thus far they have only used CRISPR to create novelty items, such a rainbow-colored bacteria or a new strain of yeast to alter the flavor of beer. However, the trivial nature of these changes should not blind one to the fact that a complete amateur can permanently change the genetic structure of a living organism – and obtain results that could never arise in nature.

Defenders would argue that this is done all the time by plant and animal breeders who select for certain traits and cross-mate suitable candidates to produce a new genome. This argument is also used to defend the use of GMOs (genetically modified organisms most often associated with food products). However, this argument is completely false! The scope for mixing genes in nature is highly restricted. Even though a great deal of variation can often be achieved despite these restrictions, breeders are unable to step beyond these natural boundaries.

Genetic engineering via gene-editing dispenses completely with these restrictions. The CRISPR technique allows one to select any fragment of DNA – from any source – and insert it into the target cell. For example, the gene that codes for bio-luminescence in certain species of fish could be inserted into the DNA of a tomato to make it glow in the dark. Nothing like that can occur in nature.

CONCLUSION

We have given enough information to show just how powerful this technology has become. Its implications for the future of humanity are profound. Our study of Bible prophecy is certain to be deficient if it fails to take this rapidly changing science into account.

We will begin our assessment with a few short observations.

Firstly, general awareness of this technology is abysmal. The mainstream media are doing very little to inform the public about it. To the extent that it receives any attention, the emphasis is generally on its potential benefits in the field of medicine or food production. Given that recent discoveries in bio-engineering, notably CRISPR and stem cell manipulation, are among the most remarkable in the history of science, the dearth of serious discussion about their impact on society is simply inexplicable.

Secondly, the scientific community is surprisingly sanguine about these revolutionary advances. Those who know enough to understand the serious risks involved seem reluctant to speak openly about them, very likely because of the adverse effect that this would have on their careers. A surprisingly high proportion of academics and post-grads in many fields – including evolution, paleontology, astronomy, and climatology – are obliged to keep their doubts to themselves if they want to retain their positions, publish papers, attend symposiums, or receive funding for further research.

Thirdly, even where researchers are prepared to speak openly about the risks, they significantly understate their variety and extent. Virtually nobody wants to talk about 'biohacking' or the possibility that cross-species experimental research may already be well under way in secret laboratories, not just in China or North Korea, but right in the heart of Europe and the US.

Fourthly, we have no independent, third-party account of how this technology is being developed and used. The main players provide most, if not all, of the information that we have about their activities. Because of this, obvious questions are not being asked. For example, when Big Step #1 was taken, the world community of scientists working in this field then knew that certain enzymes had the ability to cut open DNA. This should immediately have spurred further research to determine if other enzymes could achieve even better results. After all, Big Step #5 (CRISPR) comprised the identification of just two elements – a better gene-cutting enzyme and the RNA guide mechanism that led the enzyme to the right fragment of code. Nothing was invented. Nothing was designed. No new theory or paradigm was required. The two elements were already present in nature, waiting to be found. We are asked to believe that it took the best brains in the business about 40 years to find this new, more precise gene-cutting enzyme. On the contrary, it is far more likely that this technology has been exploited in clandestine labs for decades and that a multiplicity of experimental chimeras and hybrids have already been produced.

When the LORD reveals Himself to mankind, he does so through His Word. He refers again and again to the indisputable fact that all things were made by Him. He alone is the Creator. He made, not just the heavens and the earth, but "all that in them is" (Exodus 20:11 and Acts 4:24). From this we know that He expects all living beings and organisms to retain the form that he gave them.

This interpretation is consistent with the term "after [his/their] kind" which appears 12 times in the first seven chapters of Genesis. Every creature at Creation had a "kind" or category that was unique to itself. This would suggest that it possessed a basic genotype beyond which it never strayed, no matter how often it interbred with other members of the same species.

Each genotype in turn has an immense range of expression. We can see this in the species that man has interbred more than any other, namely the dog. Despite the incredible variations in size, shape, coat, temperament, and behavior, they are all members of just one species or "kind" – *canis*. However, no matter how many attempts are made to interbreed a dog with a cat, another "kind," it won't happen.

Bioengineering has changed all of that. With CRISPR it is possible to 'mate' a cat (*felis silvestris*) with a dog by taking genes extracted from the genome of one and adding them to the genome of the other. The resulting creature may still be regarded as a dog with "cat genes" (or a cat with "dog genes"), but it will clearly no longer qualify as either a cat or a dog if too many genes are transferred. If male and female versions of such a creature were bred and released into the wild, it would be a completely new species, capable of producing viable progeny, just like any other species.

This is not Biblical. It is not what God ordained. And it is counter to all that He established for man in His Word.

The LORD gave Adam one task before he rebelled – to name the animals. Each species came before him and Adam gave that species a name. Throughout the Bible we find instances where a person's name is an expression of his essential nature. So when Adam was given the task of naming the animals, he was being asked to appraise the characteristics or essential nature of each species. Thereafter, the name would remain unchanged, just like its essential nature. Through this exercise God was teaching Adam that each of the species that He had created had a fixed nature. We also know from His Word that everything that God created was "good" – a perfect expression of His holy will. It is impossible to improve upon His work.

Through its pursuit of gene-editing, science has gone down a very dangerous road. It has rejected the natural order established by God and brazenly arrogated to itself the right to design new species, or to make salient alterations to existing ones.

Most contend that they are doing this for the good of mankind, but they have no way of knowing what's "good" for mankind. Furthermore, they have only an infantile understanding of genetics and microbiology, a field so complex that even the simplest processes can have astonishing ramifications. Virtually all genetic research over the past 40 years has been of the 'let's try it and see' variety – make a change somewhere in the genetic code, then see how the organism develops. Unless the effects of a specific change have already been analyzed under laboratory conditions, it is impossible to predict what will happen. Even processes that are well understood can easily throw up unexpected results under certain circumstances.

No human activity is more likely to give rise to unintended consequences than genetic engineering.

Since everything that God made in the beginning was perfectly designed to support and nourish humanity, any departure from that design is bound to be deleterious to our health in some way or other. This is why genetically modified food, such as GMO soya, is harmful to human health. Our digestive system comprises hundreds of enzymes and biochemical constituents which must all work together harmoniously, in accordance with their God-given design, to support good health. Since a GMO – by definition – has departed from that design, it clearly no longer meets this high standard. As GMO consumption increases, the burden on our digestive system will become greater. This will result in due course in digestive disorders which may not be easy to diagnose but which will adversely affect the health and well-being of the entire nation.

The enormous rat shown above was not genetically engineered, but developed naturally, presumably from unusually high levels of growth hormone. With genetic engineering, all of the rats in our cities could grow to that size, or even larger! It only takes a qualified but disgruntled lab technician to apply CRISPR to this end and release a few dozen GM versions into a sewer. Within a few years, the city – or as many cities as the technician decided to target – would have an acute vermin infestation and a serious health problem. If the technician also turned off the genes that curb aggression, these highly prolific creatures could render large parts of our cities uninhabitable.

The scope for malicious use of this technology is almost endless. For example, CRISPR makes it possible to splice a potent flu virus – such as avian flu, H5N1 – onto a common throat virus like *streptococcus*, which is spread widely throughout the human population and is highly contagious. There are several thousand people on earth today with the know-how and the facilities to do this. The resulting pandemic would kill hundreds of millions across the world.

A Biblical Warning

The Word of God has warned us not to meddle in such matters:

> **"Thou shalt not sow thy vineyard with divers seeds: lest the fruit of thy seed which thou hast sown, and the fruit of thy vineyard, be defiled." (Deuteronomy 22:9)**

> **"...Thou shalt not let thy cattle gender with a diverse kind: thou shalt not sow thy field with mingled seed: ..." (Leviticus 19:19)**

The Book of Revelation refers to pandemics and famines of such severity that most of the population of the world will be wiped out. These could be the result, at least in part, of genetically engineered micro-organisms. With the advent of CRISPR, the technology needed to produce such organisms is now widely available.

While there are many signs that we are rapidly approaching the End Time, the power of CRISPR to defile the human genome and engineer potentially lethal life-forms must surely be among the most disturbing.

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09 December 2016

For further information visit www.zephaniah.eu